THE AUSTRALIAN PLANT DISEASE RECORDER

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Edited by:

K.J. Hutton, Biological Branch,
Department of Agriculture,
Box 36, G.P.O., Sydney.

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For private circulation to plant pathologists within Australia

COMMONWEALTH MYCOLOGICAL INSTITUTE
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PLANT DISEASE NOTES

FIELD AND FODDER CROPS.

SUBTERRANEAN CLOVER INFECTED BY PEA MOSAIC VIRUS:

In September 1954 all varieties of subterranean clover in a field trial being conducted at the University farm, Castle Hill, showed mosaic symptoms.

Inoculations from infected material to differential hosts, indicated the presence of the red clover strain of pea mosaic virus (A.P.D.R. 6: 3: 38-39, 1954). Isolations were made from four of the twenty-one varieties in the trial and in each case the same virus strain resulted. In some plots ninety per-cent of plants were infected and it appeared that the virus had been transferred by aphids from an established pasture, in which red clover and sub. clover var. Mt. Barker were infected.

Symptom expression was variable within and between varieties, but generally showed as a severe yellow-green mottle with some dark green vein-banding. In many cases leaves were distorted and considerably reduced in size. The following varieties showed some or all of these symptoms:- Bacchus Marsh, Bena, Berlin, Clare, Dwalganup, Edenhope, Eden Valley, Kilmore, Macarthur, Mt. Barker, Mulwala, Northam 1st Early, Pahantamau, Pink Flowered, Rouen, Ruakura, Samaria, Talarook, Wenigup, Yabba North, Yarloop.

Isolations of this virus were also made from sub. clover var. Mt. Barker from improved pasture at Badgery's Creek, some forty miles from Sydney. These results suggest that the virus is prevalent in improved pastures in the Sydney area.

- D.J. GOODCHILD AND BARBARA J. CARNE.

Faculty of Agriculture,
University of Sydney.

VEGETABLES.

A BACTERIAL POD TWIST OF BEANS:

During the past three years a pod twisting, thrips transmitted bacterial disease of beans (Phaseolus vulgaris) has been under investigation, principally because of its occurrence in certified seed crops, where confusion with other bacterial blights was possible. Bacterial pod twist is not sufficiently serious in Queensland to warrant the nil tolerance accorded other bacterial blights under existing certification rules.

The disease is characterised by marked twisting and curling of the pods, which is the result of unequal enlargement of areas of infected and healthy pod tissue. Infection occurs during flowering, and extensive watersoaked lesions appear on the pods by the time they are one to two inches long. Many of these pods wither and fall, but some continue to develop, and take on the distinctive appearance from which the suggested name "bacterial pod twist" is derived. In the field its occurrence is associated with thrip infestation of the flowers and these insects have been shown in glasshouse tests to be the agents responsible for its dissemination. Lupins (Lupinus sp.) and Phaseolus lathyroides are also susceptible, the latter often being found infected in the wild state.

An examination of the morphology, cultural characteristics and biochemical reactions of the causal organism indicates that it is a species of Pseudomonas which has not been described elsewhere.

A full account of the disease is at present being prepared.

Department of Agriculture,
Brisbane.

- J.C. JOHNSON.

A DISEASE OF PARSNIPS:

During recent years a disease of parsnips has been prevalent in vegetable gardens around Adelaide. Last winter the damage caused was very severe, more than ninety per cent. of the parsnips being affected in many gardens. The disease first appears in July or August and is more severe on heavy soil. The main symptom is a black, dry, shallow rot, largely confined to the shoulder of the root and often completely girdling it; occasionally a rot develops lower down the root.

Sections cut through affected tissue show that septate fungal hyphae are closely associated with the rot. Three species of Fusarium, two species of Phoma and one unidentified fungus were isolated from diseased parsnips and all were inoculated into healthy roots planted in John Innes compost in earthenware pots. One species of Phoma produced lesions on the parsnips similar to those observed in the field and the fungus was re-isolated from these lesions. Inoculations with all other isolates were negative.

This disease is of particular interest because of its close resemblance to parsnip canker caused by Itersonilia which was recorded by L.L. Stubbs in 1952 (A.P.D.R. 4: 4: 47, 1952). It would appear that two unrelated fungi are capable of causing almost identical symptoms in parsnips. It is of further interest that in England parsnip canker is variously attributed to Streptomyces scabies, Phoma sp. and damage following carrot fly injury.

The symptoms of the present disease differ from those of parsnip canker in two ways:

1. The rot produced is black in colour as compared with the chocolate-brown rot of parsnip canker.

2. The damage is largely confined to the shoulder of the root, whereas in parsnip canker the crown is usually affected.

The tentative name "shoulder rot" is proposed for this disease of parsnips.

Waite Institute,
Adelaide.

- ALLEN KERR

PARSNIP CANKER:

During August, September and October 1954, reports were received from a number of vegetable growers, in widely scattered parts of the Sydney Metropolitan Area, of a disease affecting parsnip roots and rendering them unfit for sale. In some cases, only a small proportion of the plants was affected but in other cases, severe losses, up to seventy-five per-cent, were experienced.

On affected roots, sunken, brownish lens-shaped cankers had developed, especially on the top half, and these extended into the root tissue to a depth of 3-5 mms. In some cases, soft rot had begun at these lesions. Affected plants were also showing small, grey leaf spots and elongated, grey, sunken lesions on the petioles.

Isolations made from roots, leaves and petioles yielded, in all cases, a fungus identified as Itersonilia sp. and this identification was kindly confirmed by L.L. Stubbs of the Victorian Department of Agriculture. Inoculation into fleshy roots reproduced the canker phase of the disease.

This is the first record of parsnip canker in New South Wales, the disease having been recorded previously in the U.S.A. (Abs. in Phytopathology 42: 1: 23, 1952) and in Victoria (A.P.D.R. 4: 4: 47, 1952).

Department of Agriculture,
Sydney.

- J. WALKER

POWDERY MILDEW IN POTATOES:

Over the past three years potatoes grown during the summer and autumn in the Adelaide hills and plains have been quite severely affected by powdery mildew. No perithecium has been observed but, as far as can be determined from the conidial form, the organism is similar to E. cichoracearum.

The organism infected stems, petioles and leaf blades, showing up as a whitish-grey powder late in the growing season. Light brown lesions were common on the stems and petioles, and the fungus spored profusely, often completely covering the leaflets. Assessment of the damage was difficult, but there is little doubt that in some cases it reduced yield, and in a few this reduction was considerable.

Waite Institute,
Adelaide.

- N.T. FLENTJE.

CONTROL OF TARGET SPOT ON POTATO HAULMS:

During the 1953-54 potato season, testing of cover sprays for the control of Alternaria solani (E & M) Jones & Grout, was commenced at Toolangi, Victoria.

The trial was in the form of a simple randomized block with five replications of each treatment. Plots consisted of one row, fifty links in length with two unsprayed buffer rows between each plot. At intervals of fourteen days for three successive fortnights, the haulms were sprayed at the rate of two quarts of the appropriate fungicide per plot. On the day preceding the application of fungicide, a random sample of thirty leaves was taken from each plot to assess the incidence of target spot therein at that time. The tubers were subsequently harvested and the yield per plot was determined.

The following analysis of results of treatments is based upon the percentage of healthy leaves sampled during the final observations on disease incidence.

Treatment	% Healthy Leaves	Log (X + 1) where X = % Healthy Leaves	Av. Weight of No. 1 Tubers per Plot	% No. 1 Tubers of Total Yields
			lbs.	
Parzate 1 oz. in 3 gal.	48.0	1.69	29.0	63.7
Manzate 1 oz. in 3 gal.	55.2	1.75	32.7	71.3
Bordeaux 4:3:40	21.9	1.36	26.8	67.1
Bordeaux 4:6:40	19.4	1.31	31.6	71.0
Cuprolane (Copper oxychloride)	30.6	1.50	31.3	68.4
No Treatment (Control)	12.5+	0.13	30.9	63.5
Difference for significance 5%		0.15	8.3	12.56
1%		0.21		

+ The control was ignored in the analysis as it is obviously inferior to any treatment.

After the third application of fungicide, spray damage became apparent on haulms in all Bordeaux mixture plots.

The above analysis suggests that:

(1) Parzate and Manzate were superior to the other treatments in the control of the disease,

(2) There was no correlation between disease incidence and yield, and

(3) No Fungicide affected yield.

Department of Agriculture,
Melbourne.

- C.R. MILLIKAN

FRUIT

ERADICATION OF VENTURIA INAEQUALIS FROM INFECTED APPLE LEAVES:

Following the successful eradication of Venturia inaequalis from infected Delicious apple leaves in 1953 (A.P.D.R. 6: 1: 7, 1954) using an autumn foliage spray of 0.3 per cent. phenyl mercuric chloride, and attempt was made to determine the minimum effective concentration of this and two other organic mercury compounds.

Fourteen heavily infected Granny Smith trees at Batlow were sprayed on May 4, 1954, with phenyl mercuric chloride (P.M.C.), phenyl mercuric acetate (P.M.A.) and phenyl mercuric dinaphthylmethane disulphonate (P.M.F.) at concentrations ranging from approximately 0.2 per cent mercury to 0.0007 per cent mercury. The results, assessed on the formation of perithecia and the measurement of rates of discharge of ascospores throughout the spring and early summer, indicate that eradication of V. inaequalis was achieved by the following spray treatments:

Chemical	% Chemical in Spray	% Mercury in Spray (approx.)
P.M.C.	0.3	0.192
P.M.C.	0.1	0.064
P.M.A.	0.33	0.197
P.M.A.	0.11	0.066
P.M.F.	5.0	0.2

A sub-sample of leaves treated with 1.67 per cent P.M.F. (0.067 per cent mercury) collected on November 8 showed a slight discharge of ascospores; otherwise this treatment was also effective.

Perithecia developed in all treatments at the third highest concentration (0.007 per cent mercury), but the rate of discharge of ascospores was lowest in the P.M.C. treatment.

In view of this, and the fact that P.M.C. was the only non-phytotoxic chemical, it seems that this compound may be the most suitable of those tried. The minimum effective concentration of P.M.C. for eradication was found to lie between 0.1 per cent. and 0.01 per cent. This range will be investigated next autumn.

Department of Agriculture,
Sydney.

- K.E. HUTTON

ERADICATION OF APPLE SCAB:

Last autumn (April-May), in N.S.W., three plots of apple trees, heavily infected with black spot (Venturia inaequalis), were sprayed with organic mercury fungicides at high concentration, in an attempt to eradicate the disease. At Yetholme a plot of eighty trees (ten varieties) was sprayed with 0.3 per cent phenyl mercuric chloride; at Orange a plot of eighty-eight trees was sprayed with 0.1 per cent. P.M.C. and at Batlow a plot of two hundred non-bearing young trees was sprayed with 0.11 per cent phenyl mercuric acetate. Each plot was isolated by about one mile from the nearest alternative source of inoculum.

The plots at Batlow and Orange were infected by mid-November, but the plot at Yetholme, which had the best isolation, and which received no sprays this season, remained free of black spot until December 5, when the first lesions became visible. Inoculation apparently had occurred during a rain period on November 19 and 20. On those two days the wind was blowing from the direction of the other orchards in this small district and the evidence suggests that infection resulted from a spore shower from those orchards. As no infection occurred during six previous rain periods (twenty-one wet days from the beginning of October to mid-November, during which 11.04 inches of rain were registered) which occurred during the period of maximum availability of ascosporic inoculum, it seems reasonable to assume that there was no inoculum available within the eradication plot. This belief is supported by the fact that a few pear trees in this plot, which received neither the eradicant autumn spray nor spring sprays, were heavily infected early in November, and also by the fact that apple scab lesions were observed on November 5 in a neighbouring orchard which had received a spring schedule of sprays but no

autumn eradicant.

Further eradication plots will be established this autumn with a minimum isolation of approximately five miles.

Department of Agriculture,
Sydney.

- K.H. HUTTON

SUSPECTED RING POX VIRUS IN APRICOTS:

Apricot fruits in a small isolated group of about ten trees at Berri this summer have exhibited symptoms very like those described in America for "ring pox" of apricots. The trees are forty-four years old Moorpark on apricot stock which have been healthy and vigorous until recently, but are now declining.

The trouble was first seen in the summer of 1953-54 on five or six trees and appears to have spread to another five or six trees this year. The symptoms were seen only on fruits. In mid-November the green fruits presented a bumpy appearance due to raised lumps 3-4 mm in diameter and 2-3 mm high; from one to twenty of these occurred distributed at random over each fruit. Towards the end of November the swelling of the fruit tended to even out the bumps, but in some cases small cracks 1 mm wide and 1 mm deep by 1-3 mm long developed where the bumps had been. In mid-December as the fruit began to yellow, brown water-soaked areas or rings showed up where the bumps had been. Except for the above cracking the surface was unbroken. The brown discolouration extended down 2-5 mm into the flesh of the apricot, and in sections this appeared to be due to a collapse and browning of cells. There was no evidence of bacteria, fungi or insects in relation to the lesions.

On most trees all fruit was affected, but on trees at the periphery of the group lesioned fruit was seen only on branches closest to the uniformly infected trees. There was no definite foliage symptom although some leaves, when held in restricted light, showed markings similar to that described in America. Budwood has been taken from the trees to test the virus hypothesis. Meanwhile, as it is such a small local occurrence, the trees will almost certainly be destroyed.

The author would be interested to hear whether symptoms of this nature have been seen elsewhere in Australia.

Waite Institute,
Adelaide.

- N.T. FLENTJE

PSOROSIS OF CITRUS:

In 1953 nineteen Valencia orange trees on rough lemon stock in a Niagara Park (Gosford district) orchard developed a gummosis condition similar to, but more severe than, that which occurred at Redcliffs in Victoria in 1951 (A.P.D.R. 5: 3: 29 and 5: 4: 46, 1953). The trees were thirty-two years old and the affected specimens occurred in an irregular line through the orchard. The onset of the gummosis was sudden and spectacular. Gum blisters developed on individual limbs or on several limbs in each tree, the blisters being arranged in discontinuous lines, sometimes extending from the butts to the smaller branches. Individual blisters varied in size, and on some larger branches coalesced into fairly extensive patches. Gumming was profuse and originated from pockets in the outermost xylem layers. At the same time the foliage became very yellow, no new growth was made and some of the branches died out. The bark over the larger blistered areas also died and was invaded by Phomopsis citri. The trees thereafter made a gradual recovery. Affected limbs made a little new growth and are no longer conspicuously yellow. The lesions continued to develop but now appear as exfoliating bark lesions of the psorosis A type. Gumming in the wood is restricted to a narrow ring of disintegrated xylem below the extending bark lesions, as is found with psorosis A, and which also follows many other types of injury.

A similar outbreak occurred at Arcadia in 1953. Eleven trees of Wallent mandarin, two on trifoliata and nine on rough lemon showed gumming, branch yellowing and die-back. These also recovered partially and are now showing bark lesions of the psorosis A type. The parent trees of these mandarins appear to be free of disease.

The Thompson grapefruit previously noted (A.P.D.R. 5: 3: 29, 1953) have shown no extension of symptoms. As pointed out by L.L. Stubbs (A.P.D.R. 5: 4: 46, 1953) the profuse gumming symptoms have some resemblance to psorosis B as described by Fawcett. In a recent review of citrus diseases in California,

Klotz (Calif. Citrograph, October 1954, p. 455) has suggested that psorosis B is merely a different symptom manifestation of psorosis A which results "when healthy sweet orange trees are infected by inoculum taken directly from bark lesions of psorosis A." Assuming that an insect vector has been responsible for the introduction of the virus, this seems to be a reasonable interpretation of the phenomenon seen at Arcadia and at Niagara Park, the profuse gumming and yellowing being the shock phase and the psorosis bark symptoms the chronic phase of the disease.

The pattern of the outbreaks in N.S.W. and at Redcliffs in Victoria is highly suggestive of spread by an insect vector.

Department of Agriculture,
Sydney.

- LILIAN R. FRASER.

A POSSIBLE PSOROSIS-TYPE VIRUS OF CITRUS:

The gummosis condition which developed at Redcliffs and Curlwaa (see preceding article and A.P.D.R. 5: 3: 29, 1953) was at first thought by the author to be a phase of Florida gummosis. This diagnosis was based on the similarity of the anatomy and mode of development of the gum blisters to that described for Florida gummosis, but, as this has not been maintained in the new growth, the resemblance to this disease has disappeared. There are, however, a number of orchards in N.S.W. where a disease resembling Florida gummosis does occur. In view of the confusion and conflicting statements regarding Florida gummosis in American literature, the N.S.W. disease will be tentatively regarded as a type of psorosis distinct from psorosis A. The occurrences under observation to date are as follows:-

1. All trees of Surprise navel (A.P.D.R. 5: 3: 29, 1953) which were propagated from a single tree imported from Florida in 1925 by Mr. R.G. Benton of the N.S.W. Department of Agriculture, and distributed about 1930. These include eighty-three trees at Narromine which show a wide range in symptom intensity. Some have large boil-like blisters, causing distortion of the trunk and lower branches, and exuding gum through breaks in the bark from cavities in the xylem, identical with those described for Florida gummosis. No bark exfoliation occurs. Most of the trees have slight to moderate blister development, the blisters

often being arranged in discontinuous lines, and a few have one or two small blisters only. The young growth on all trees shows conspicuous development of psorosis pattern, every leaf being affected.

2. A block of about eighty Washington navel type oranges in an orchard at Curlwaa planted in 1914. These are well grown trees and show little evidence of decline attributable to the disease. Each tree shows only a few slight blisters of the characteristic type. Psorosis leaf pattern development is profuse on the young growth of all trees.

3. A block of two hundred Washington navel type oranges at Barooga. These were planted in 1924 and most are satisfactory, some being excellent trees. Blister development is severe in one tree, moderate in one, very slight in about twenty others and could not be seen at all in the remainder. Psorosis leaf pattern development is profuse on the young growth in all trees.

This disease is noteworthy because of the prominent development of psorosis leaf pattern in the young growth, which is not a feature of most of the psorosis A seen in N.S.W., and for the extreme variability in the severity of blistering, even in the case where it is established that all trees originated from a single parent.

Department of Agriculture,
Sydney.

- LILIAN R. FRASER.

VIRUS DISEASES IN PEACHES:

A small block of Phillips' Cling peaches at Berri South Australia has been showing symptoms suggestive of virus infection for several years. The trees are only five to six years old, and the most obvious symptoms are in the fruit. Shortly after setting, a high proportion of the fruit fails to develop, and may fall or remain on the tree. The rest of the fruit develops normally, but this development is arrested at various times, so that at maturity the fruit on any one tree may vary from 1.5 cm diameter up to normal fruit. In addition, part of a single fruit may cease developing while the remainder goes on normally to give a distorted fruit. Only one to two per cent. of the original fruit set finally matures normally.

Where development is arrested the tissue is rather woody and slightly bitter to taste. Externally the suture is abnormal, being quite bumpy in character and there are frequent pimples up to 5 mm in diameter and 3 mm thick scattered over the cheeks of the fruit.

The general appearance of trees is fairly normal, except for a tendency to clubbing or rosetting of side shoots and leaves at the ends of the branches. There is no evidence of any field spread of this condition.

The presence of pimples or warts and the abnormal bumpiness of the suture has also been observed in some Elberta peaches in the same area but it is not known if the two conditions are related. Investigations are in hand to check the possibility of these symptoms being due to virus infection. Meanwhile the author shall be very glad to hear whether similar symptoms have been observed in any other State.

Waite Institute,
Adelaide. - N.T. FLENTJE.

STRAWBERRY MILDEW:

Strawberry mildew (Sphaerotheca humuli) has been seen only once in N.S.W., on a crop of Royal Sovereign grown from runners imported from Tasmania. In December 1954, a survey was made of strawberry seedling varieties raised by the N.S.W. Department of Agriculture and under trial by a number of strawberry growers. In a plot at Casula one of these seedling varieties was found to be quite severely affected by mildew, though commercial varieties nearby were apparently free.

Department of Agriculture,
Sydney. - LILIAN R. FRASER.

MISCELLANEOUS PLANTS.

CANKER OF CUPRESSUS SPP:

In A.P.D.R. (1: 3: 44, 1949) the fungus Coryneum cardinale was recorded as the cause of severe die-back of Monterey cypress (Cupressus macrocarpa) in the Orange district, N.S.W. Since then further specimens of canker on Cupressus macrocarpa have been collected in various parts of the State and an examination of these and a re-examination of the first material has been made. It is now considered that the causal fungus is Monochaetia unicornis (Cke & Ellis) Sacc. and that Coryneum is not present in N.S.W. Other species of Cupressus which have been found to be attacked are C. lawsoniana and varieties and C. sempervirens. C. lusitanica appears to be only rarely affected.

Department of Agriculture,
Sydney.

- LILIAN R. FRASER.

MISCELLANEOUS NOTES.

WANTED - BEAN ANTHRACNOSE MATERIAL:

Cultures of the bean anthracnose fungus (Colletotrichum lindemuthianum), or diseased pods, are requested from other States for investigations at present being carried out on this disease in New South Wales. Details of locality, variety being attacked and severity of infection would be appreciated, if available. Please address parcels to the author, c/- Biological Branch, Department of Agriculture, Box 36, G.P.O., Sydney.

Department of Agriculture,
Sydney.

- J. WALKER.

VIRUS X-FREE GREEN MOUNTAIN POTATOES AVAILABLE FOR DISTRIBUTION:

It was reported in a letter to the Editor of Nature in 1953 (Nature 172, 816) that a virus X-free clone of Green Mountain (Early Carman) had been derived from a shoot apex treated with malachite green in culture solution. This clone has now been propagated in the field in two stages. The first crop was grown in isolation at Paddys River, A.C.T., the second crop at Strathpine, approximately fifteen miles from Brisbane. There are now approximately eighty pounds of tubers available for distribution. Although there were apparently no potatoes in the vicinity of the Strathpine crop, it was not an isolation area. No absolute guarantee can therefore be given that the material is entirely free from aphid-borne viruses. Every precaution was taken and every off-type plant rogued, but an isolated late-season infection may have occurred.

Should any research worker require a few tubers for observation or experiment, they may be obtained by writing to:

DR. D. NORRIS,
C.S.I.R.O.,
Plant and Soils Laboratory,
C/- Parliament House Post Office,
BRISBANE. Q.

C.S.I.R.O.
Brisbane.

- D.O. NORRIS.

COMMONWEALTH MYCOLOGICAL INSTITUTE NOTES.

C.A.B. REVIEW CONFERENCE:

The Review Conference of Commonwealth Agricultural Bureaux will be held in London from June 8 to July 7, 1955, when the work, finance, direction and extension of usefulness of the Institutes of Mycology, Entomology and Biological Control and the ten Bureaux dealing with various aspects of plant and animal production will be critically examined. The last Review Conference was held in the summer of 1950. It is probable that the Australian delegates to this year's Conference will be Sir Ian Clunies Ross, Chief Executive Officer, C.S.I.R.O., and Mr. J.H. Cummins, a former Chairman of C.A.B. Executive Council.

I have been requested to provide comment on the activities of the Commonwealth Mycological Institute concerning Australian interests and would be glad to receive expressions of opinion from my colleagues in Australia. The rising costs of abstracting and publishing have brought under examination the type of material which is abstracted and whether it would be desirable to introduce more selection, say for instance, to include only research material. I would be glad to hear if plant pathologists desire that R.A.M. maintains its present coverage, or of any modifications they would like introduced.

Department of Agriculture,
Sydney.

- C.J. MAGEE.
C.M.I. Official Correspondent.